



# Water for Tomorrow

California's Water, Our Responsibility

Volume One • Number One

**Where Does Your  
Water Come From?**

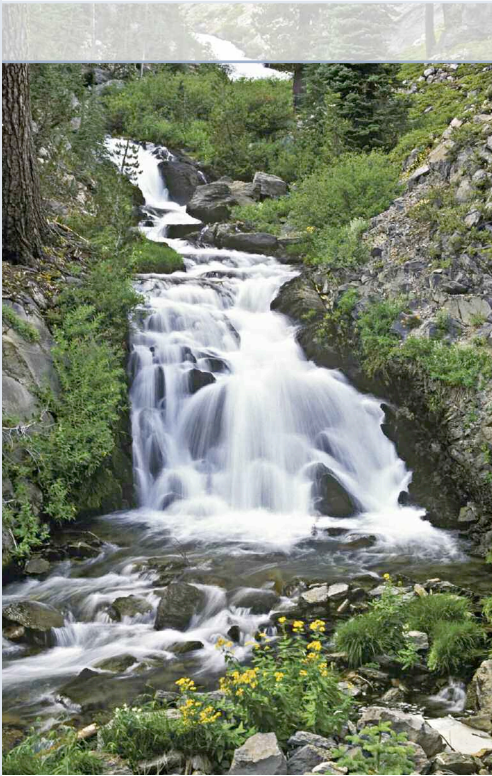
**Why Conserve?**

**A Word with PBS Host  
Huell Howser**



**NATIONAL  
GEOGRAPHIC**

A Custom Publication



# dear READERS,

California and Water. The two will always be linked. Water is *the* critical element in the well-being of our people and our environment, the “liquid gold” that keeps our economy strong. But we’ve tended to take it for granted — perhaps because water has been reliably provided at a very economical cost. Ask where water comes from and most people are likely to reply, “the faucet.”

Lately you might have noticed things are changing. We now read in the news daily that water is a *finite* resource around the globe, and that having enough for everyone in any given year is far from guaranteed. Unless we change our ways and invest in our future, that trusted faucet could run dry, and soon. But what kinds of changes are we talking about? How should we live differently? And why does California, in particular, find itself with water shortages?

We at *Water for Tomorrow* believe knowledge is power and that all of us can and will pitch in to use water more responsibly if we understand the problem. So we created this publication to help you understand where your water comes from, its value, and why shortages seem to be more common lately. We’ve also included some great tips for conservation to help you save water inside and outside your home.

*Water for Tomorrow* is brought to you by a partnership through National Geographic custom publishing and the Association of California Water Agencies (ACWA), whose members are responsible for 90 percent of the water delivered in the state. We care about water issues, and a recent statewide survey tells us that 61 percent of you ranked “having sufficient water supplies” near the top of your concerns, while 85 percent expressed a willingness to make significant changes in household water use.

In future issues we will continue to look at how California is working to protect our water supply today and for the future. This fall, we’ll discuss the profound impact water shortages are having on our farmers. Plus, you can always visit us online at [www.waterfortomorrowmag.com](http://www.waterfortomorrowmag.com) where we will continue to share with you smart ideas for conserving water at home, at work, around the yard. If we each do our part to learn about water and conserve where we can, we can make a difference for California. Will you join us?

Sincerely,

Wendy B. Murphy  
Editor-in-Chief

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## NEXT ISSUE

Find out how one of California's most venerable industries, agriculture, is faring due to the ongoing water supply challenges. Also, learn about our water hub, the Sacramento-San Joaquin Delta, and see which cities are making the biggest strides in water conservation.

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# Where Does Your WATER Come From?

In California, chances are the water coming out of your tap has made an impressive journey. Our state is justly famous for its spectacular natural beauty, abundant sunshine, fertile farmlands, and enterprising communities. These characteristics have combined to make California one of the most productive places on earth. The critical feature that allows this modern miracle to happen involves moving water from where the rain falls to where the water is needed in a reliable and sustainable way. Large parts of California are semi-desert year round, and almost everywhere our climate is hot and dry during the long summer when water is in highest demand.

Mount Lassen rising above Lake Almanor





Without the development and innovative management of the state's limited water resources, the story of California's success would be very different, for water is truly vital to our economy. Figuring out ways to spread this already limited resource ever farther, to serve everyone adequately — including homeowners, farmers, businesses, industry, fisheries, and the environment — has always been difficult. And the challenges are growing yearly, as our population increases. If we don't continue to invest in the system and strive to conserve, it's pretty clear that the place we call home is headed for serious shortages. (For more on this see pages 12 and 13.)

How have we managed so far? Through developing a system of dams, reservoirs, aqueducts, and pipelines that carry vast amounts of water from where it is collected to the places where it's most needed. Where does your water come from? It depends. The water's journey could be short. But more likely than not, some of it has traveled many miles, and sometimes even hundreds.

## Starting Points

To understand how it all works, let's start with the water itself. Some of the water we consume is *groundwater*. Groundwater is the accumulation of precipitation that is hidden in the rocks, sands and gravels below the surface. Wells are drilled and pumping stations built to raise the water to the surface. These underground reservoirs, also known as aquifers, are found only in select areas. They must be managed carefully so the amount of water pumped out does not exceed the amount recharged over time. (A strategy called water banking is used in some areas to recharge underground storage basins using water transported from areas with water surpluses.) Groundwater typically accounts for about 40 percent of statewide water use in average years. The percentage can be considerably greater in drought years when *surface water* is in short supply.

Surface water refers to water in rivers and streams that originates as rain and snow. About two-thirds of the precipitation we receive evaporates into the air, soaks into the ground, or is absorbed by vegetation. The remainder runs down hillsides to lakes, ponds, rivers and streams that lie within natural basins called watersheds. Some of the runoff flows into wild and scenic rivers or environmentally sensitive estuaries and eventually makes its way to the ocean. The rest is considered California's "usable" water supply, or what is actually collected and stored in the state's vast water storage and delivery system.

In normal years as much as 75 percent of California's usable water falls as snow and rain in the northern third of the state between November and March, mostly on the western slopes of the Sierra Nevada mountains. Climate change is likely to add a new variability to this pattern, however. Another significant portion of the state's surface water comes from the Colorado River, which originates in the Rocky Mountains and traverses a number of other mountainous states to the east. As much as 80 percent of California's water demand is in the southern two-thirds of the state where very little surface water is found naturally.

To remedy the existing inequities between supply and demand, federal, state and regional authorities have built perhaps the most complex water storage, water transport, and flood management system found anywhere. Major regional projects serve Los Angeles, San Francisco and the East Bay. Dozens of local projects serve people around the state. Three of the largest water projects in the state that serve multiple cities and agricultural areas include:

**The Central Valley Project (CVP)** runs 450 miles through a vast oblong valley that begins with Lake Shasta in the north and extends to Bakersfield in the south. The CVP captures and conveys water from the state's largest river, the Sacramento. Farther south, the San Joaquin and several other



San Luis Reservoir, April, 2002

smaller rivers contribute to the system. Work began on the CVP in the 1930s and was originally conceived as a relatively modest state project. When financing failed, the CVP was taken over by the federal Bureau of Reclamation. Construction grew to include 18 dams and reservoirs, 500 miles of canals and aqueducts, 11 hydroelectric power plants, and three fish hatcheries. Today the CVP delivers enough water to supply about one-third of the irrigated farmland in the state and close to a million households in the Central Valley and parts of the Bay Area.

**The Colorado River Aqueduct (CRA)** diverts a share of the water coming into California from the Colorado River. A 1922 agreement among the seven states that form the river's drainage area paved the way for the construction of the Hoover Dam in 1936. Shortly after, construction began on a number of downstream storage and diversion structures, including the CRA, which was engineered, built and managed by the Metropolitan Water District of Southern California, a water-wholesaling agency that serves 26 member agencies in six counties from Ventura to San Diego. The CRA serves the water needs of Los Angeles and many other Southern California communities through a system of nine reservoirs, five pumping plants, 63 miles of canals, 92 miles of tunnels, and 84 miles of buried pipeline. Under the terms of compacts and treaties forged among

seven Western states, several sovereign Native American tribes and Mexico, California is entitled to 4.4 million acre-feet of the Colorado's water in normal years, though supplies have tightened in recent years as other states have begun to take their full allotment. In addition to the CRA, another major network called the All-American Canal System serves several irrigation districts in the Imperial Valley and elsewhere in southeastern California.

**The State Water Project (SWP)** was designed to deliver public water supplies from areas in the north, where water is plentiful, to areas of need in the Bay Area, Central Valley and Southern California. Citizens voted to approve the water system in 1960 and construction began in 1961 on SWP facilities including the Oroville Dam that spans the Feather River. By the mid 1960s, the first water deliveries were reaching the San Francisco Bay Area and what would later become Silicon Valley. In 1972 the SWP reached its southern limits: two canals veer east and west on the far side of the Tehachapi Mountains near Bakersfield. The Coastal Branch Aqueduct, a 116-mile long offshoot to Santa Barbara and San Luis Obispo, opened in 1997. Today the SWP boasts 32 storage facilities, reservoirs and lakes, 17 pumping plants, three pumping-generating plants, five hydroelectric power plants and about 660 miles of open canals and pipelines. Along the way water is supplied via 29 public

water agency contractors to 23 million Californians and 775,000 acres of irrigated farmland. About 70 percent of SWP water is delivered to urban users and 30 percent to agricultural users.

The pumps for both the State Water Project and the Central Valley Project are located in the southern portion of the Sacramento-San Joaquin Delta. California's largest estuary, the Delta is where the rivers of the western Sierra converge before heading toward San Francisco Bay. While these projects are considered engineering marvels and have provided the foundation for California's economic success, they were not built to meet all the demands being placed on them today. Nor were they built with the Delta's current environmental issues in mind — problems caused by a variety of factors including water diversions, invasive species and the loss of habitat. Due to the Delta crisis, the SWP and CVP are being challenged to provide for people and the environment even though the system wasn't built to do both. State, federal and local agencies are working to develop long-term solutions to achieve that goal.

Next time you pour that glass of water, take a shower, or do a laundry load, think about all the natural and manmade contributions that go into delivering this precious resource. What steps can you take to assure that it will always be there? How can you and your neighbors use water more wisely? Right now, learning how to conserve must become our daily business.



## Five products to help you go blue

For every water-conserving product you introduce into your home you are doing your part to make our future brighter and greener. Below are some easy retrofits, but to learn about the full range of “WaterSense” products available, check with your local water agency or visit [www.epa.gov/watersense](http://www.epa.gov/watersense).



### Niagara Conservation's low-flow faucet aerators

The single most effective way to conserve water in your home is by installing faucet aerators. It cuts consumption by 50 percent and the modification is easy. \$2–10, [www.niagaraconservation.com](http://www.niagaraconservation.com)

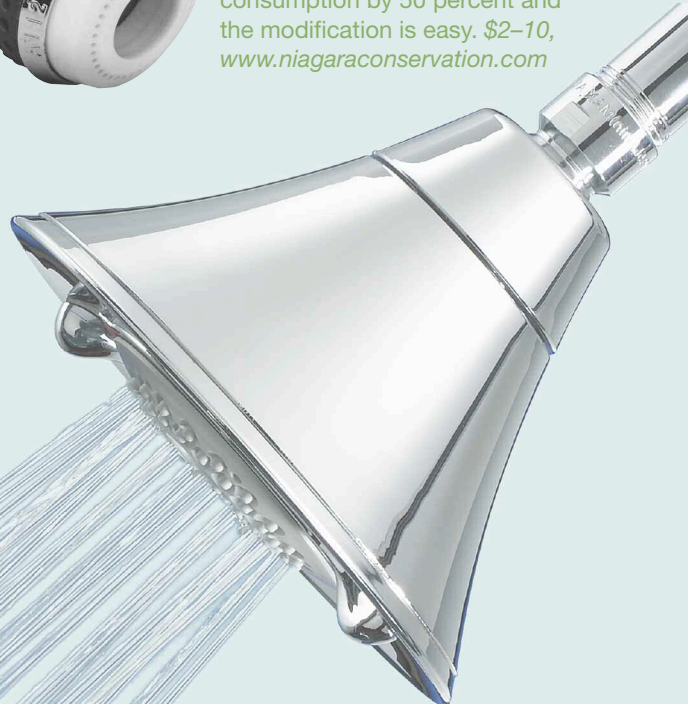


### Rainbird's ESP-SMT Smart Modular Controller

Save time, money, and water with this affordable and easy-to-program residential smart irrigation controller. \$425, [www.rainbird.com](http://www.rainbird.com)

### American Standard's FloWise 1.5 gpm low-flow showerhead

This 1.5 gallons-per-minute showerhead offers sleek design and great performance, and it will reduce your water consumption by 30 percent. \$57, [www.americanstandard.com](http://www.americanstandard.com)



### Melnor's seven-pattern AquaGun

Don't let water go to waste with this multi-purpose nozzle featuring an ergonomic rubber grip and heavy-duty metal construction. \$10, [www.melnor.com](http://www.melnor.com)



### Bosch's Nexxt 300 Series washer

Conventional clothes washers use about 40 gallons of water per load. Make the eco-friendly transition to this Energy Star-qualified, front-load washer and cut that amount in half. \$850, [www.boschappliances.com](http://www.boschappliances.com)

# WHAT'S YOUR WATER WORTH?



**Even in California, where water shortages are common, the cost of water is rarely considered by most residents. In most communities it's still less than a penny per gallon at the tap. But if you stop to think about the time, technology, and money it takes to gather, treat, convey and distribute residential water, it's a bargain at any price.**

So what exactly determines the cost of your water? First, there are capital costs associated with building and maintaining the vast and complex water distribution system that brings water from its source to where you live. As you read in “Where Does Your Water Come From” on page 4, the water that reaches many California consumers often travels hundreds of miles and passes through dozens of reservoirs,

storage facilities, power plants, aqueducts, canals, pipelines, and tunnels. These facilities were built and paid for by construction loans and other forms of financing that the users — you and the contracting agency that buys your water wholesale — must pay back over time.

Even the parts of the state's vast water delivery system that were built many decades ago require ongoing funding.

Aging parts must be upgraded, conduits extended to meet new needs, and advanced technologies introduced as they come along. And with these improvements, the ultimate costs must be passed along to the consumers. In some districts that lie far from the point of water origin, capital expenses and debt service can represent as much as 70 percent of the monthly water bill.



Operating expenses account for the other, generally smaller share of the bill. These costs include the day-to-day bulk purchase of water from a water supplier. They also go toward the salaries of the highly trained personnel, such as plant technicians, water engineers and managers required to maintain all the equipment and facilities. Substantial energy costs make up another portion — while many of our water systems generate hydroelectric power as a byproduct of storing and releasing large volumes of surface water, the power generated provides only about a third of the total energy needed to keep the system functioning. The rest must be paid for as a share of your water bill.

Consider, for example, what it takes to move water conveyed through the Delta by the California Aqueduct up and over the Tehachapi Mountains to customers in Southern California. Fourteen pumps at the Edmonston Pumping Plant on the northern edge of the mountains lift the entire aqueduct flow — as much as 33,000 gallons per second — nearly 2,000 feet high to get it to the other side. That feat takes a lot of electricity.

## Meeting Regulations

Another big-ticket item is the cost of water treatment. A lot of effort goes into protecting water sources so that treatment is minimal, but in some areas costs are still substantial. Residential water has high safety and quality standards in California. Various treatment processes eliminate undesirable organisms and chemicals. Water is also treated for hardness, acidity, taste, odor and something called turbidity, which is how clear water looks in the glass. Water that is used strictly for irrigation and other agricultural purposes is generally purchased at considerably cheaper rates.

This is mostly due to the fact that fewer treatment processes are involved.

Lastly, your water bill may reflect a share of the costs involved in managing environmental concerns, including the cost of alternative supplies your water district may need to purchase as a result of rules in place to protect species.

## Metering Usage Aids Conservation

Whether your water bill is calculated based on a flat rate or a metered rate also plays a part in pricing. Flat rate payers pay a preset rate, often based on the size of house and lot. Metered rate payers are billed according to the number of units, called CCFs (1 CCF = 748 gallons), flowing into the house through the meter on their service pipe. On site readings are taken periodically by the utility's meter reader or, in more modern versions, are sent via radiofrequency to a computer. Meters in most urban and suburban communities are located in a box set near the sidewalk or street. Legislation passed in 2004 calls for all remaining flat rate users to become metered with deliberate speed.

Metered water usage has proved to be a boon to conservation. Meters are excellent tools by which users can maintain greater individual control over water habits and keep water bills down. Many water agencies have or are adopting a tiered rate system that provides additional incentive to conserve. Customers pay a single lower rate for the first tier unit of water used (a figure based on estimated basic needs) and progressively higher rates for the second and third tier. As water shortages continue to be an issue for California, expect to hear more about this approach.

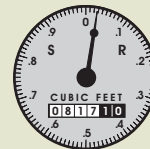
## Making Sense of Your Water Bill

Your water bill contains valuable information that can help you keep track of your consumption. The data presented in the bill reflects the amount of water that has flowed through either a straight-reading or round-reading meter outside your home. Adopt new water-saving practices and then monitor the numbers on subsequent bills to see how you have managed water use. Two types of water meters are described below.

### SRM

On the SRMs some of the calculation is already done and appears in a window marked "cubic feet."

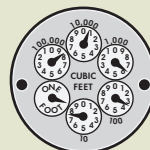
Subtract the first four digits of the previous reading from the current reading to get the total cubic feet of water recorded during the time lapse. Charges are based on "units" used, each unit being 100 cubic feet (CCF). If you prefer to convert CCFs to gallons, multiply CCFs used by 748. (Many agencies use 1,000-gallon units, rather than 100.)



### RRM

To read the many-dialed RRM, focus on the three dials at the top, starting with the 100,000 dial and read clockwise. If the hand on any dial is between two numbers, use the lower number in your calculations. Subtract your last reading from the current reading to get CCF usage, applying the same method described above to convert to gallons.

To check for leaks in your system turn off all faucets and do not flush toilets for 15 minutes. If the sweep hand on the SRM or the "one foot" dial on the RRM continues to move, you probably have a leak somewhere that needs fixing.





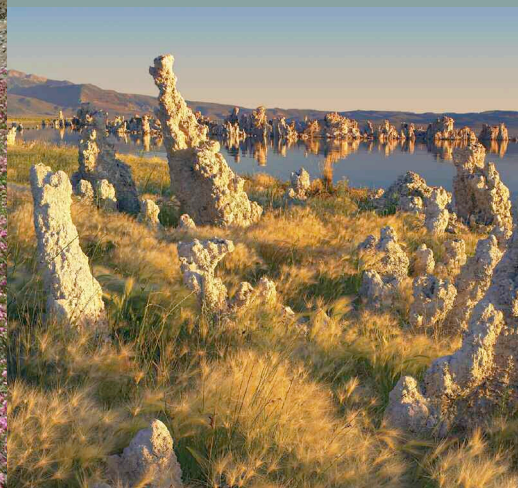


## Water is the best of all things.

— Pindar (522 B.C. – 438 B.C.)

**This page, clockwise from top left:** fire-charred pines, Yosemite; Edna Valley vineyard; wind and rain eroded tufa towers at Mono Lake; Sacramento River

**Opposite, clockwise from top:** Wasco Lake, beneath the Sierra Nevadas; Point Lobos State Reserve; Kokanee salmon in Taylor Creek at Lake Tahoe; the Sacramento-San Joaquin River Delta









# Why CONSERVE?

**After three years of below-average rain and snowfall in Northern California,** and with environmental problems triggering very significant cuts in water deliveries to some areas, water is in short supply in many regions of the state. There is an immediate need to conserve water. But if California is to successfully manage the needs of its growing population, support agriculture, and nurture the environment, then long-term sustainability plans must be put in place. Governor Schwarzenegger declared a statewide drought emergency in late February. “This is a crisis, just as severe as an earthquake or raging wildfire,” he said. He went on to predict that the combination of natural and man-made conditions that have brought on this crisis could be with us a lot longer than any drought we’ve ever known before. He called on everyone to join in a massive effort to conserve precious water now and in the future.

Water shortages are not, of course, a new idea in California. Shortages are a common feature of our cyclical weather patterns in which several years of relatively wet conditions are followed by longer, deeper cycles of dry. But occasionally mere shortages grow into sustained droughts, which are marked by tinder-dry hillsides, raging wildfires, nearly empty reservoirs, and hasty efforts to transfer remaining water supplies where most needed. Many of us remember in particular the devastating dry spell that settled in from 1987 to 1992, and the shorter, historically harsh two-year drought that parched the Sacramento and San Joaquin Valleys from 1976 to 1977. Farmers, a mainstay of our economy, suffered devastating crop losses in those years and the natural environment sustained significant, even irreversible damage, in some places. Right now we are in the midst of a similar situation, with farmers once again bearing the brunt. (See sidebar.)

Lessons learned in earlier droughts have been put in place, though some would say much more can be done. For example, new legislation has been enacted to encourage water-conserving building codes on new construction, and water metering has been extended to many communities that had not monitored individual use before. Millions of dollars have been invested in upgrades of some local and regional public/private water projects, including the creation of several local reservoirs and underground water banks. Water recycling and desalination are also on the rise. Even the face of California agriculture has evolved with many farmers shifting from lower value, water intensive crops to higher value, water efficient ones and upgrading their irrigation methods. But several new factors make today’s water shortage situation more serious.

Not only has the population that must be served grown by nine million since

the last multi-year drought, but climate change is altering our rain and snowfall patterns. A series of storms in February 2009 helped boost our snowpack and reservoirs, but not enough to make up for the previous two dry years. Water storage in our main reservoirs remains low, and this year’s Sierra snowpack — the natural “reservoir” whose melting waters feed a series of manmade reservoirs downstream — cannot make up for the major deficits experienced in 2008 and 2007.

## Delta Blues

Regardless of the rain and snowfall we receive, California will still face shortages. Environmental problems in the heart of the state’s water system are reducing water deliveries for many California cities, farms and businesses. The problems will continue to restrict water supplies even when the current drought ends and more normal rain and snowfall patterns return.





Lake Oroville, February, 2009

Two of the state's largest water systems — the State Water Project and federal Central Valley Project — move water through the Sacramento-San Joaquin River Delta to more than 25 million people in the San Francisco Bay Area, Central Valley and Southern California and to more than 2.5 million acres of farmland.

The Delta, however, is in an ecological crisis, with several key species in decline. New rules in place to protect one threatened species — the Delta smelt — have resulted in permanent restrictions on water project operations.

The restrictions, the result of a federal lawsuit, are reducing water deliveries by as much as 30 percent in average years. Other regulatory actions involving salmon and long-fin smelt are expected to restrict supplies even further in 2009.

These restrictions are just one symptom of the problems facing the Delta.

Other factors include conflicts arising from the 50-year-old infrastructure used to convey water through the Delta, pollution, non-native species, land subsidence and seismic issues that have led to sharp declines in both ecosystem health and water supply reliability.

Public processes are under way to address these challenges. In the meantime, however, California needs a survival strategy to keep water flowing to the cities, farms and businesses. Conservation is a key part of this strategy.

To that end, state and local agencies have partnered in a new statewide public education effort called "Save Our Water." The program is aimed at educating Californians on the state's water supply challenges and encouraging them to reduce the amount of water they use every day. See ideas on how to save within this magazine.

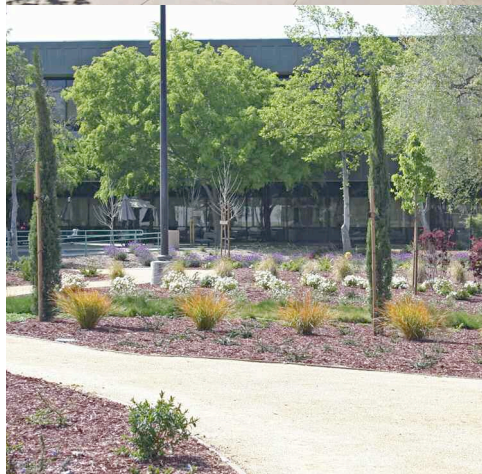
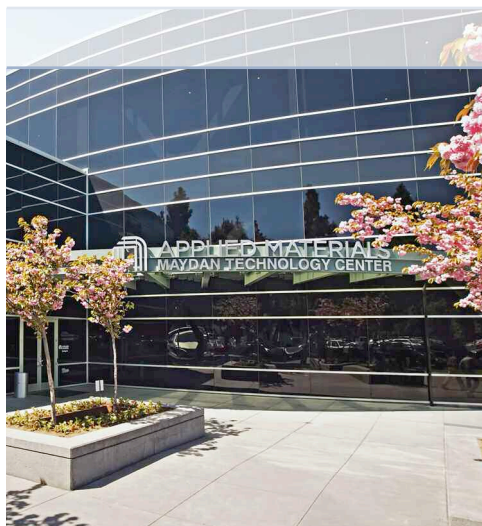
## Farmers in the Crossfire

With less water from the Central Valley Project or State Water Project to irrigate crops or water thirsty cattle, and with local groundwater in very short supply, many of California's 1.1 million farmers have already been forced to take drastic measures this year. Land that for generations has provided the state and the nation with a cornucopia of fruits, nuts, vegetables, grains and cotton thus remains fallow this growing season and perhaps for many more. Dairy herds are being thinned due to reduced pasturage. In parts of Southern California, permanent assets such as avocado trees (below) that have taken years to cultivate, are being stumped in the hope of saving them. Some citrus growers are simply uprooting their trees due to lack of water. Almond growers in the Central Valley are removing older, less productive stock to save their limited water supply for younger ones. And some water-intensive row crops are being phased out altogether.

The smaller harvest will cause market prices to rise just as surely as farming profits and jobs will be lost. "We're just one step short of disaster here," says Tim Larson, a grower in Kings County. "I've already taken out about 160 acres of alfalfa and we're trying to figure out how to save our grapes and pistachios." Larson is looking at what else can go but he adds ruefully, "After a while there's not much left."







## APPLIED MATERIALS, INC. MAKES WATER CONSERVATION PART OF ITS SUCCESS

### Northern California: Sunnyvale —

Recently, the Silicon Valley Water Conservation Awards Program presented the best-in-class business award to semiconductor technology experts, Applied Materials, Inc. The company's comprehensive approach to water conservation is saving 40 million gallons a year — reducing its overall consumption by 16 percent.

No strangers to conservation efforts or the marvels of technology, a committee of volunteers representing employees from the Facilities Group, the Apps Lab Group, and EHS/Sustainability came up with a complement of high- and low-tech conservation solutions to benefit AM's 3,800 California employees. Improvements were made in all three of the company's California campuses: Santa Clara, Sunnyvale and Fairfield.

Simple software changes were orchestrated at AM's R&D facility in Sunnyvale so that when wet process lab tools (used when water polishes silicon wafers) were in idle mode they would not require continuously-running water. This reduced water consumption by 25 percent, and is now saving millions of gallons of water annually.

The facility in Sunnyvale supports semiconductor manufacturers as they transition to new technologies. Here, they can test, customize and pre-integrate these new technologies for various device requirements. At the center recycled water is used to feed cooling towers and scrubbers and de-ionized water is being reclaimed as well. AM consolidated its tools and adjusted critical technological

settings so the facility now saves 10.5 million gallons of water each year. In this regard, AM's savings are trickling down to its customers.

Other modifications included installing sensor-activated faucets and low-flow toilets, as well as introducing xeriscaping, which incorporates drought-resistant native plants and shrubs in the landscape. In total, AM is using 51 million gallons of water less per year than it did in 2006. That's enough water to fill 2,500 swimming pools.

Bruce Klafter, head of Applied Materials' Corporate Responsibility and Sustainability Group, says environmental stewardship is in the company's DNA. "The employees have really gotten behind our efforts," he explains. "It is these sustainability issues that people really seem to care about."

Klafter goes on to say that, "In full-scale production facilities, the amount of water we consume is considerable, and the attention we're giving water is on the rise. Whether the motivation is one of corporate responsibility or economics, water is taking center stage in today's business environment."

Applied Materials has been inspired to set a global water conservation goal to reduce consumption by at least ten percent in its facilities around the world by the year 2012. "Overseas, only so much water can be consumed," Klafter says. "It's up to them — correction, it's up to all of us — to use it wisely."



# AFTER FIRE, NEW HOME IS MODEL FOR WATER EFFICIENCY

**Southern California: San Diego County** —

After their home was destroyed in Southern California's 1993 Cedar Fires, San Diego County residents Richard Caputo and Carol Nagy Jacklin rebuilt with an uncompromising eye to efficiency. Their new 1,712-square-foot home is a model for conservation inside and out.

The couple's water-savvy solutions have slashed consumption by 33 percent and created a vibrant living environment that demonstrates how conservation can bring beauty — and a new brand of abundance — to any home.

"The need to rebuild presented us with an opportunity to do things right the second time around — from the ground up," says Caputo.

Their in-home efforts include installation of low-flow toilets, faucets, and water-miser showerheads. The duo has populated their home with water-efficient appliances. Their front-loading washer cuts water use by 50 percent.

The need for plentiful hot water to shower, cook, and clean clothes can be a drain on anyone's conservation plans. To eliminate the wasteful running of water to reach desired temperatures, Caputo installed a circulating hot water system, which makes hot water almost instantly available. Highly efficient appliances use not only less water, but less energy to heat water.

Caputo says saving energy is an important benefit of conservation. "It takes massive amounts of energy to pump and process San Diego's water," explains the retired aerospace engineer. "Water conservation is one of the cheapest — and easiest — ways for

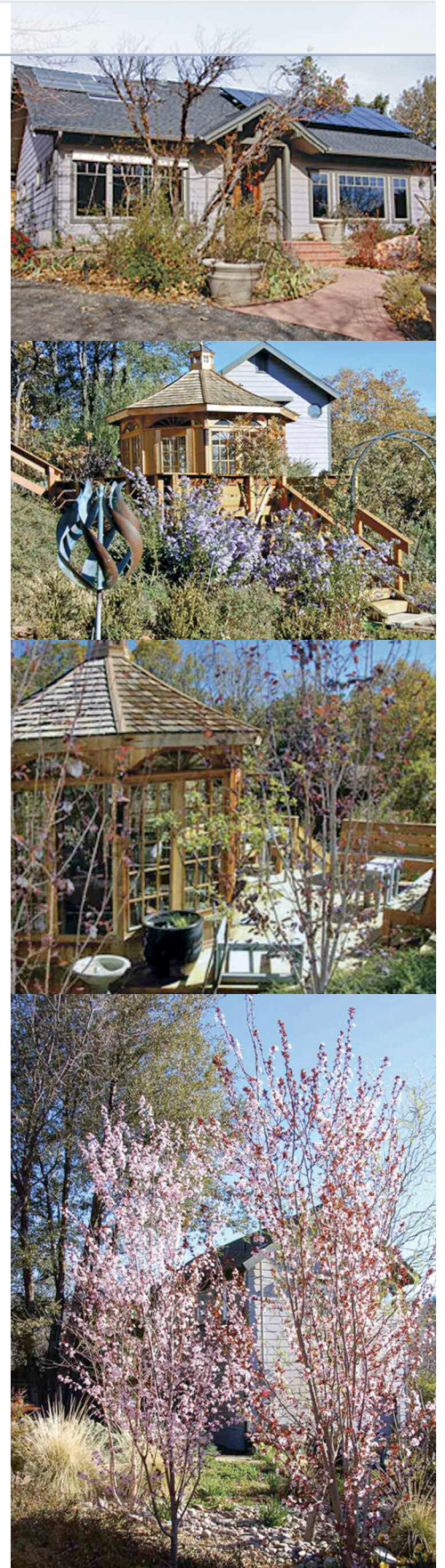
families to reduce both their water and their carbon footprints."

Rich and Carol's conservation efforts are bearing fruit in their garden as well. A gray water system captures 50 percent of the house water for use in a drip irrigation system. Rainwater is collected using gutters and barrels and gravity-fed underground pipes. The system runs on timers, which are adjusted seasonally.

"Effective conservation can be simple to execute," says Jacklin, "but it requires a plan." She proclaims lawns are out, unless space is needed for children to play. Creating paths with destination points using rocks, pots, trellises and benches add interest while reducing water demands. To prevent overwatering, all plants are grouped according to their water appetites and sun and wind tolerances. Adding organic material to the soil ensures water is retained where it's needed most. The use of colorful, drought-resistant flowers and shrubs brings vivacity to any garden.

"Our holistic approach not only saves water," says Jacklin. "It also creates a healthier environment for our plants — and a better living space for our family."

"When you employ multiple strategies with a vision of how they might integrate into your home and garden, it's amazing how effectively you can cut consumption — and costs," says San Diego homeowner Rich Caputo. Master gardener in training Carol Jacklin says even the color and composition of gardening pots can impact water requirements. "Water evaporates more quickly in clay pots, and dark, heat-absorbent containers in direct sunlight can cook delicate roots," she says.





# Join the Blue Revolution: **GoodBetterBest**

Transform your household into a model for smart water use and you will immediately start reaping rewards. There are a multitude of actions, large and small, that you can take to conserve water inside and outside your home. Below are some great suggestions to get you started, as well as some interesting facts. For instance, did you know that the majority of Californians are unaware that over 50 percent of residential water is applied to landscapes and lawns? Remember that whether the savings results are small or large, every one of these actions will have a positive impact on your environment.





## Outdoors

**GOOD:** Spread two to three inches of organic or synthetic mulch around plants, shrubs, and trees. This allows the underlying soil to retain moisture and reduces weeding, both of which benefit plant growth. You won't need to water as often either.

**BETTER:** Install a smart irrigation system that uses state-of-the-art technology to care for your lawn and gardens and cut your outdoor water consumption by 25–45 percent. This computer-based method of irrigation integrates current weather data from the Web with analysis of soil moisture content collected by ground sensors to provide precision watering for outdoor areas.

**BEST:** Plant drought-resistant trees, shrubs, and plants that are native to your region. This is called xeriscaping and its fundamental benefit is water conservation, though other advantages include minimal upkeep and lower water bills. Check with your local garden center to find out which species are recommended for your area.

## Kitchen

**GOOD:** Wash fruits and vegetables over a bowl or bucket in your sink and reuse it to water plants. Also, don't keep the tap running when washing dishes. Instead, clean them in a sink full of soapy water and rinse afterward.

**BETTER:** Fix leaky faucets. Those drips may not seem like a lot, but collectively, American households with defective faucets waste more than 1 trillion gallons of water annually. Did you know that:

60 drops	=	192 gallons
per minute		lost per month
90 drops	=	310 gallons
per minute		lost per month
120 drops	=	429 gallons
per minute		lost per month

**BEST:** Install faucet aerators. It's the single most effective way to conserve water in your house. Old-fashioned faucets use 2.75 gallons per minute, but low-flow aerators can reduce flow to 0.5 or 1.5 gpm, saving the average home 14,700 gallons per year. Most modern faucets are threaded inside to accept an aerator, making installation even by the least handy almost instantaneous.

## Bathroom

**GOOD:** Turn off the tap while brushing your teeth and save roughly two gallons per minute. No purchases or products required, just a little eco-thoughtfulness.

**BETTER:** Install a low-flow 1.5 gallons-per-minute showerhead — this can save the average family close to 8,000 gallons of water per year. Showering accounts for 17 percent of a household's indoor water use. Cutting back on hot water expenditure has the secondary benefit of reducing energy consumption, too.

**BEST:** Replace your old toilet with a newer low-flow, dual-flush model and you will conserve 50 percent more water in the bathroom. (Non-conserving toilets can use more than 3.5 gallons per flush but high-efficiency toilets — or HETs — only require 1.6 gallons per flush.)

# Water SMARTS

By Rich Norris © 2009, Rich Norris

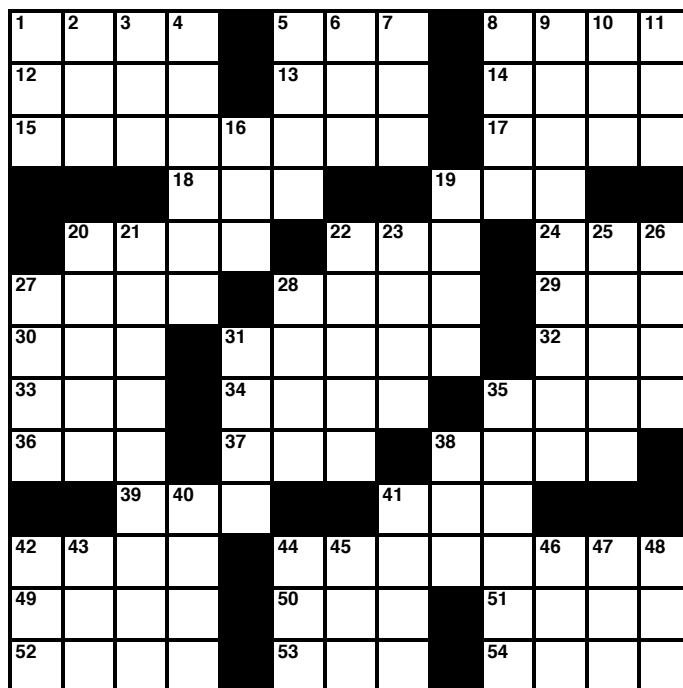
## ACROSS

1. "\_\_\_ Revolution" (smart 22-Down consumption)
5. Jack Sprat's taboo
8. Nine-digit IDs
12. Brought into the world
13. Suffix with meteor
14. Chain known for breakfasts
15. Consume sparingly
17. \_\_\_ Scotia
18. Employ
19. Kiev's country: Abbr.
20. Get ready for surgery
22. Used to be
24. Kitchen source of 22-Down
27. Told fibs
28. Dallas hoopsters, for short
29. Brewpub order
30. Covert \_\_\_ (spy doings)
31. Measurer of 22-Down
32. College transcript no.
33. Letter after cee
34. Federal power dept.
35. Seven days
36. Tel Aviv's land: Abbr.
37. "Days of \_\_\_ Lives"

38. One giving orders
39. Marriage promise
41. Corp. honcho
42. Low-\_\_\_ faucet (22-Down saver)
44. 22-Down conduit
49. Drought easer
50. Pecan or hickory
51. White winter blanket
52. Car loan figures: Abbr.
53. Refusals
54. Up-and-down toy

## DOWN

1. English channel: Abbr.
2. English john
3. Spigoted coffee server
4. Came after
5. Log-burning event
6. Off-road transport: Abbr.
7. Golf ball support
8. Dishwashing place
9. Supply deficiencies
10. Eleventh mo.
11. Health resort
16. Sixth sense, briefly

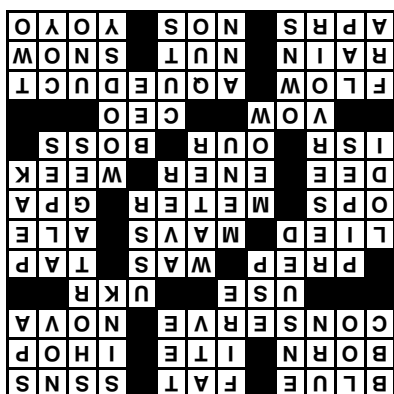


19. Cold War foe: Abbr.
20. 22-Down conduits
21. 22-Down storage place
22. Subject of this puzzle and this magazine
23. Declare as fact
25. European mountains, to the French
26. Highest level of usage
27. City near Sacramento
28. Restaurant's list of dishes
31. Cat's cry

35. Like a forest
38. Buzzer in the garden
40. Has title to
41. Reductions
42. Monk's title
43. Once around the track
44. Columnist Landers
45. Status \_\_\_
46. Spanish "one"
47. Playing hard to get
48. What it takes to tango?

## add it up

### ANSWERS



**5** — the minimum number of gallons of water needed to meet a person's daily needs, according to the World Health Organization

**\$100** — The rebate residents of Southern California will receive when purchasing a high-efficiency toilet, or HET.

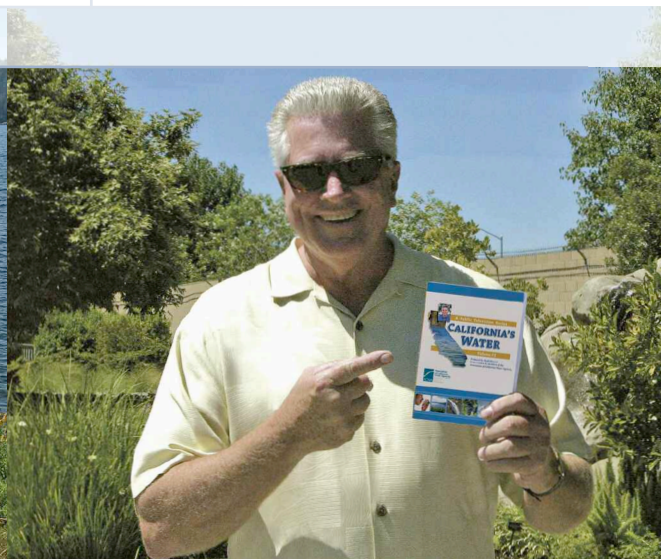
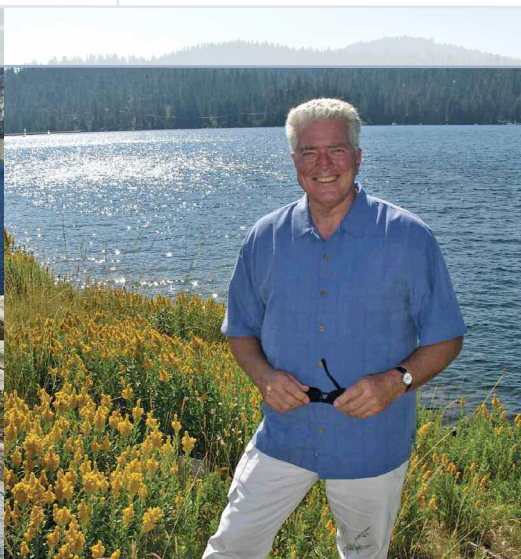
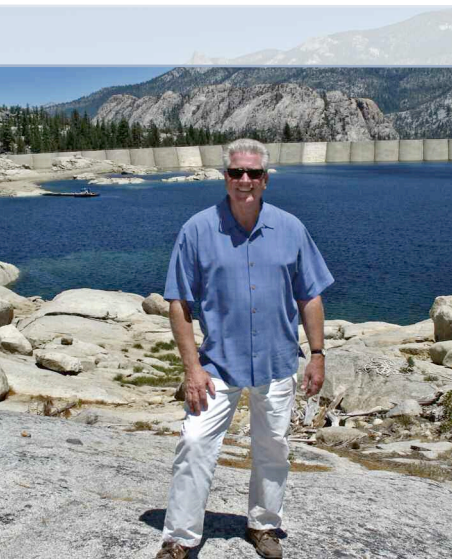
**122** — number of gallons used daily by the average resident of Los Angeles, California

**2000** — gallons of water an average family of four can save every month by installing a low-flow showerhead

**2 million** — The Central Valley Project, a major water conservation development, generates enough electricity annually to meet the needs of this many people

**67** — percentage of people in California who rely on the Sacramento-San Joaquin River Delta for their water needs





# A Word with... Huell Howser

The renown television host sits down with us to discuss the health of California's water system.

**Q. How did you get concerned about California's Water issues?**

**A.** Everybody should be concerned about California's water. The average Californian has traditionally taken their water for granted, and before I started this I wasn't much different. There's a natural tendency here to think that water comes out of the tap in the same way that food comes out of the grocery store. Reporting on the subject turned out to be a perfect assignment. Like most people I hadn't followed the water agenda closely beforehand and I knew little or nothing about what went on to deliver water to all of us. Each episode was a learning experience for me and my viewers.

**Q. What impressed you most in your travels?**

**A.** Two things. First, was the sheer complexity of California's plumbing system. When you really get into it you have to be amazed at the ingenuity and foresight that went into its planning and construction decades ago. Second, I was bowled over by the professionalism and commitment I found among the people who run the various facilities today — everyone from the guys

who maintain the levees and measure the snow mass up in the Sierras to the ones who keep the pumps running and treat the water. I came to see that they've been fighting a lonely battle for years, pretty much invisible to the rest of us. Only recently are ordinary citizens and even the politicians starting to pay attention to what they do. Water experts have been sounding the alarms for a long time, but so long as clean water was flowing, most Californians tended to think everything would always be OK.

**Q. How did you go about making the PBS series "California's Water"?**

**A.** We started with a roadmap from ACWA and then followed the story wherever it took us. To make the original 21 30-minute segments took over two years as my crew and I traveled all over the state. We will continue to add two or three more episodes per year because how California meets these challenges is an ongoing story. And I'm delighted that people continue to watch the original episodes. They're shown at schools and at civic clubs and on TV. You can also see them as streaming videos at [www.acwa.com/television/segments.asp](http://www.acwa.com/television/segments.asp).

**Q. What kind of feedback have you had from the public?**

**A.** The reaction has been 100 percent supportive. People regularly thank me for demystifying the whole issue, for explaining terms like groundwater and aquifer and acre-feet in terms they can understand. For two weeks after we did the segment on the Delta, people in Los Angeles were constantly coming up to me and saying, "I never knew what all the fuss was about the Delta and why it matters until you took us there."

**Q. Do you think Californians are finally getting the conservation message?**

**A.** Yes, people are starting to understand that the days of unlimited water are gone and that we have to adapt to that fact. The amount of water we have is not going to increase nor is the state going to stop growing. So we've got to make what we have go further. Sure, there'll be wet years and dry years, the reservoirs will be up and they'll be down. Water conservation will become part of everyday life and in a generation or so people will marvel that we ever even debated about it.

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**“When I brush  
my teeth, I turn  
the water off.”**

**Save 8 Gallons  
Per Day**

Even small actions can make a big difference. Something as simple as turning off the faucet while brushing your teeth can save 8 gallons a day. Really, it's that easy! Look at how you use water inside and outside your home. If we all work together, we can save California's water.

